

**RESPONSIVENESS SUMMARY FOR
ANNUAL REPORT FOR
TREATABILITY STUDIES PROGRAM
FISCAL YEAR 1991**

ROCKY FLATS PLANT

**U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden, Colorado**

ENVIRONMENTAL RESTORATION PROGRAM

February 1993

ADMIN RECORD

A-SW-000570

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REVIEWED FOR CLASSIFICATION/UCNI	
BY	G. T. Ostdiek <i>877</i>
DATE	<i>3-31-93</i>

**FINAL
ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM**

Document No. and Title: ANNUAL REPORT FOR TREATABILITY STUDIES AT ROCKY FLATS PLANT
FISCAL YEAR 1991 (MARCH 1992)

Page 1 of 8

Reviewer Name(s): PRC FOR THE ENVIRONMENTAL PROTECTION AGENCY (April 15, 1992) Date: October 20, 1992

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
1	1	<p><u>GENERAL COMMENTS:</u></p> <p>There are inconsistencies throughout the annual report between the information presented in tables and appendixes. References to technologies in the text, tables, and appendixes should be consistent. The technology data sheets included in Appendixes B and C should include all the technologies listed in the tables.</p> <p>The statements of work (SOWs) included in Appendix D should include an SOW for each technology that has been selected as a sitewide bench-or pilot-scale treatability study. Missing SOWs should be added to the document.</p>	<p>A single technology data sheet was prepared in Appendixes B and C for technologies which were very similar (e.g., one data sheet was prepared for UV/chemical oxidation of organics to describe UV/chemical oxidation with ozonation, peroxide oxidation, ultraviolet oxidation, ultraviolet photolysis) to avoid repetition of data sheets that were only slightly different.</p> <p>In the annual report Appendix D SOWs were only included for technologies identified for testing in the annual report which had not previously been identified in the Final TSP. SOWs for technologies identified for testing in the Final TSP were included in that document.</p>
2	2	<p>The names used to refer to specific technologies in different parts of the documents are not consistent. For example, "aerobic biodegradation" is listed in Tables 4-13 and 4-2B, while "aerobic biological reactor" is used in the technology data sheet (page C-1 in Appendix C). Names used to refer to various technologies should be consistent throughout the document to promote clarity.</p>	<p>Inconsistencies in terminology will be reviewed and will be modified as required in the 1992 annual report.</p>
3	2	<p>Final Comment/Resolution Summary of EPA Comments on the Final TSP (DOE, 1992) states that some comments made on the final TSP will be addressed in the annual report. However, the annual report does not address all comments. For example, comments on the August 28, 1991 TSP suggested the management decision factor be described in further detail. The response to the comment is that "a more complete discussion will be provided in the annual report" (DOE, 1992). However, the "management decision factor" is not mentioned</p>	<p>The "management decision factor" is intended to provide RFP the opportunity to consider management issues such as available annual budgets, potential impact on facility operations, etc. in the development, assignment of priority, and scheduling of test programs. Additional clarification will be provided in the 1992 annual report.</p>

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FISCAL YEAR 1991 (MARCH 1992)

Page 2 of 8

Reviewer Name(s): PRC FOR THE ENVIRONMENTAL PROTECTION AGENCY (April 15, 1992) Date: October 20, 1992

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
4	2	<p>in the annual report. It is unclear why the management decision factor is omitted from the screening process in the annual report. The annual report should provide all information requested in the comments, to explain the unclear information presented in the TSP.</p> <p>One of the criteria for final screening of treatment technologies is whether the technology offers advantages over other available technologies. Tables 4-5A and 4-6B include columns for these criteria which list "yes" or "no" responses. It is unclear what the advantages or disadvantages are. In addition, it is difficult to draw conclusions based on the information presented in the document. For example, no advantages can be observed from the information presented in Table 4-2B and technology data sheets for slurry phase bioreactors compared to the other technologies with the same functions listed in Table 4-2B. The only exception is implementability, which is not one of the significant advantages stated in paragraph 2, Section 4.1.4 (page 4-4). The documentation on the selection process should be more comprehensive, especially for the final screening process. In addition, the advantages of a selected technology in comparison to other technologies which perform a similar function should be explained in more detail in the text or in the representative tables.</p> <p><u>SPECIFIC COMMENTS:</u></p>	<p>The preliminary and final screening process used for the annual report is the same methodology employed in the Final TSP. Table 4-2B represents the preliminary screening of biological treatment technologies applicable to PCBs in soil/sediments. Implementability is one of the criteria for preliminary screening. Section 4.1.4 describes the criteria for the final screening process. The screening process will be reviewed in the 1992 annual report to identify if there should be changes in the screening process previously used in the Final TSP.</p>
1	3	<p><u>Pages 3-1 through 3-3, Section 3.1 and 3.2.</u> These sections describe the ongoing bench- and pilot-scale tests conducted at the specific operable units (OUs), including the bench-scale test for the technology selected for use in the U.S. EPA Superfund Innovative Technology Evaluation (SITE) demonstration at RFP. The text does</p>	<p>The programs discussed in Sections 3.1 and 3.2 are part of the treatability test program underway at RFP. These sections were included to describe the test programs, status, and results available.</p>

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REVIEW/COMMENT RESOLUTION FORM**

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FISCAL YEAR 1991 (MARCH 1992)

Page 3 of 8

Reviewer Name(s): PRC FOR THE ENVIRONMENTAL PROTECTION AGENCY (April 15, 1992) Date: October 20, 1992

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
		not indicate whether these technologies are part of the sitewide treatability studies. The comments on August 26, 1991 final TSP suggest that the relationship between the current treatability studies and the sitewide treatability studies program should be described. The response to this comment indicates that the annual report will review the interrelation between the SITE demonstration test, the ongoing OU-specific studies, and the sitewide program (DOE, 1992). The annual report should provide this information. <u>Rationale:</u> The annual report should include all necessary information requested in the TSP. In addition, the annual report should describe the relationship between the treatability studies currently being conducted at specific OUs at RFP and the sitewide treatability study program to clearly understand the work being done and to be conducted at RFP.	At the time of preparation of this annual report, there was limited data and results for the pilot- and bench-scale testing programs in progress. Future annual reports will discuss results as data becomes available and the integration of these programs with the sitewide treatability study program.
2	3	<u>Sheet 3 of Table 2-2 and Sheet 5 of Table 2-3.</u> Table 2-2 lists the chemical compounds aldrin, alpha-BHC, alpha-chlordane, atrazine, beta-BHC, 4,4-DDT and aroclor-1254 under the semivolatiles category, while Table 2-3 lists aroclor-1254 under the polychlorinated biphenals (PCBs) category. In general, these chemicals should be listed under the Pesticides/PCBs category. <u>Rationale:</u> Chemical compounds should be correctly listed and the information presented in different tables should be consistent.	The inclusion of Aroclor-1254 in the semivolatiles category in Table 2-2 was an error. Aroclor-1254 should have been listed under PCBs category. Sufficient differences in potential treatment technologies, anticipated performance standards, and regulatory requirements exist to separate semivolatile organics (including pesticides) and PCBs into separate categories.
3	4	<u>Sheet 1 of Table 4-2B.</u> Sheet 1 of this table lists the biological technologies to treat PCB-contaminated soil. The name "aerobic biodegradation" listed in this table is not consistent with the name used for the same technology in the technology data sheet (Appendix C), where the name "aerobic biological reactor" is used. The name	Inconsistencies in terminology will be reviewed and modified as necessary be included in the 1992 annual report

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REVIEW/COMMENT RESOLUTION FORM**

Document No. and Title: ANNUAL REPORT FOR TREATABILITY STUDIES AT ROCKY FLATS PLANT
FISCAL YEAR 1991 (MARCH 1992)

Page 4 of 8

Reviewer Name(s): PRC FOR THE ENVIRONMENTAL PROTECTION AGENCY (April 15, 1992) Date: October 20, 1992

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
		used for the same technology in different parts of the document should be consistent. <u>Rationale:</u> Consistency between appendixes and tables contributes to the clarity of the document.	
4	4	<u>Sheets 10 through 12 of Table 4-2B.</u> The headings of these sheets list the contaminant groups as metals; they should be radionuclides. The headings of these pages should be corrected. <u>Rationale:</u> The information should be correctly and accurately presented to contribute to the clarity of the document.	The comment is correct. The correct heading for contaminant group for these sheets is radionuclides. This information will be corrected in the 1992 annual report.
5	4	<u>Table 4-4B.</u> This table explains why the soil and sediment technologies did not pass preliminary screening. According to the table, in-situ vitrification was rejected because it is "currently not available and withdrawing from the market by vendor due to operational problems," while the technology data sheet for in-situ vitrification (page C-20) states that "the technology is commercially available." The information presented in tables and appendixes should be accurate and consistent. A recent article (Geosafe Corporation, 1992) indicates that EPA still considers using in-situ vitrification at many sites. <u>Rationale:</u> The information should be correctly and consistently presented. The rationale for excluding a technology from sitewide treatability studies should be logical.	At the time the annual report was prepared, Geosafe had withdrawn in-situ vitrification from the market due to operational problems. The technology data sheet was not altered to reflect this. The current status of in-situ vitrification will be reviewed and updated as required in the 1992 annual report.
6	5	<u>Tables 4-5A and 4-5B.</u> These tables list the final screening for contaminated ground water, surface water, soil, and sediment	The final screening process used for the annual report is the same

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REVIEW/COMMENT RESOLUTION FORM**

Document No. and Title: ANNUAL REPORT FOR TREATABILITY STUDIES AT ROCKY FLATS PLANT
FISCAL YEAR 1991 (MARCH 1992)

Page 5 of 8

Reviewer Name(s): PRC FOR THE ENVIRONMENTAL PROTECTION AGENCY (April 15, 1992) Date: October 20, 1992

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
7	5	<p>technologies. The annual report presents the following Final Screening Criteria for potential treatability study technologies: (1) that one technology offers advantages over other available technologies, (2) that the study can be conducted at bench- or pilot-scale, and (3) that no problems are anticipated for EPA, state, or community acceptance. Neither tables nor text explains why some technologies that meet the final screening criteria are rejected, such as in-situ air stripping for treating ground-water contamination with volatile organics. Detailed rationale should be provided in the text or tables for rejecting the technologies that meet the final screening criteria.</p> <p><u>Rationale:</u> The purpose of final screening is to eliminate technologies that do not meet the screening criteria for sitewide treatability studies. All technologies that meet the screening criteria should be considered for treatability studies; otherwise, detailed explanations for rejection should be clearly provided.</p> <p><u>Tables 4-5B and 4-7.</u> The tables indicate that the slurry phase bioreactor has been selected for a pilot-scale treatability study at RFP. The rationale for this selection is unclear. The reasons for eliminating aerobic biodegradation, the anaerobic biological activated carbon process, and anaerobic dechlorination from consideration for sitewide treatability studies are listed in Table 4-4B. The table states that these technologies show a low or</p>	<p>methodology employed in the Final TSP. Technologies were eliminated from the site-wide treatability program if:</p> <ol style="list-style-type: none"> 1) the information from laboratory, bench, or pilot testing is not required to evaluate if the technology would be effective at RFP. 2) the technology offers no advantages over other proven applicable technologies. 3) the technology cannot be tested at laboratory, bench, or pilot scale. 4) problems are anticipated with EPA, state, or community acceptance. <p>In Table 4-5A for the technology in-situ air stripping of volatile organics, the entry for the criteria "Additional Data from Laboratory, Bench, or Pilot Testing Needed for Selection" was No, so this technology was not selected for testing.</p> <p>The slurry phase bioreactor technology for treatment of PCBs in soil met the criteria in Table 4-5B for testing (additional data needed and advantages over other technologies). It was not amenable to bench/laboratory scale testing but was suitable for pilot scale testing. Therefore it was included for pilot scale testing in Table 4-7.</p>

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REVIEW/COMMENT RESOLUTION FORM**

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FISCAL YEAR 1991 (MARCH 1992)

Page 6 of 8

Reviewer Name(s): PRC FOR THE ENVIRONMENTAL PROTECTION AGENCY (April 15, 1992) Date: October 20, 1992

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
8	6	<p>unknown potential to meet cleanup goals and that they are in the early development stage or not sufficiently developed to reliably treat PCBs. These disadvantages are also associated with the slurry phase bioreactor technology. The information presented in the annual report presents obvious advantages of the slurry phase bioreactor technology over other technologies with similar functions, except that it uses conventional equipment. This factor is not one of the significant advantages stated in the second paragraph of section 4.1.4 (page 44). Table 4-5B also indicates that the slurry phase bioreactor offers advantages over other available technologies, but it is unclear from this table what the specific advantages are. A detailed rationale for selecting slurry phase bioreactor as a pilotscale treatability study should be provided.</p> <p><u>Rationale:</u> Comprehensive documentation on the treatment technology selection process for the sitewide treatability study is necessary. A detailed rationale should be provided for selecting or rejecting a technology in the final screening process. In particular, explanations should be included for selecting a technology with no obvious advantages over other technologies with similar characteristics, or for rejecting a technology that meets the final screening criteria.</p> <p><u>Table 4-6A.</u> The table lists the ground-water and surface water treatment technologies selected for bench- or laboratory-scale treatability studies. It is not clear what technologies in the list will be tested at the bench-scale, and what other technologies will be tested at the laboratory-scale. The table should specify the level of treatability study to be conducted for each listed</p>	<p>The other technologies cited were eliminated during the preliminary screening process in Table 4-28. The criteria for preliminary screening are discussed in Section 4.1.3. Section 4.1.4 discusses criteria for the final screening process.</p> <p>The preliminary and final screening process used for the annual report is the same methodology employed in the Final TSP. The screening process will be reviewed in the 1992 annual report to identify if there should be changes in the screening process previously used in the Final TSP.</p> <p>No attempt was made in the Final TSP or the 1991 annual report to distinguish between laboratory or bench testing. There is no difference between bench-scale and laboratory-scale testing for these reports. Discrepancies in references to technology data sheets will be corrected in the 1992 annual report as needed.</p>

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REVIEW/COMMENT RESOLUTION FORM**

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FISCAL YEAR 1991 (MARCH 1992)

Page 7 of 8

Reviewer Name(s): PRC FOR THE ENVIRONMENTAL PROTECTION AGENCY (April 15, 1992) Date: October 20, 1992

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
9	7	<p>technology. The table should also list the Appendix B page number for the technology data sheet. Most of the page numbers listed are incorrect. For example, the table lists the page number for the technology data sheets for "ozonation," "peroxide oxidation," "ultraviolet oxidation," and "ultraviolet photolysis" as B-63 in Appendix B, while page B-63 is the technology data sheet for "wet air oxidation." The internal references should be corrected.</p> <p><u>Rationale.</u> Detailed information should be provided and accurate internal references included to contribute to the clarity and utility of the document.</p> <p><u>Table 4-7.</u> This table lists the treatment technologies selected for pilot-scale treatability testing under the "soil/sediments treatment technology." According to the final screening process listed in tables 4-5A and 4-5B, the slurry phase bioreactor is the only technology selected for a pilot-scale treatability study at RFP to treat PCB-contaminated soil, while ozonation and ultraviolet photolysis are selected for ground-water and surface water treatability studies. Therefore, these two technologies should be listed under "ground water/surface water treatment technology." The information should be accurately presented in the documents.</p> <p>Similar to table 4-6A, some page numbers listed for technology data sheet are incorrect. The table lists the technology data sheet for ultraviolet photolysis as page B-59, although page B-59 describes UV/chemical oxidation. The internal reference should be corrected.</p> <p><u>Rationale:</u> Accurate information and internal references will contribute to the clarity and utility of the document.</p>	<p>The heading on Table 4-7 was in error. The slurry phase bioreactor pilot test was selected for PCBs in soil. The ozonation and ultraviolet pilot tests were selected for semivolatile organic compounds in water. This information will be corrected in the 1992 annual report.</p> <p>Discrepancies in references to technology data sheets will be corrected in the 1992 annual report as needed.</p>

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ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
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FISCAL YEAR 1991 (MARCH 1992)

Page 8 of 8

Reviewer Name(s): PRC FOR THE ENVIRONMENTAL PROTECTION AGENCY (April 15, 1992) Date: October 20, 1992

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
10	7	<p><u>Appendix B.</u> The technology data sheets in Appendix B do not include the information for ultraviolet photolysis. Appendix B should include the technology data sheets for all the technologies for ground water and surface water reviewed in the annual report. In particular, technology data sheets should be included for the technologies selected for sitewide treatability studies.</p> <p><u>Rationale:</u> Technology data sheets provide detailed information, and it is necessary to include the technology data sheets in the appendices.</p>	<p>Ultraviolet photolysis is grouped in the technology data sheet for UV/chemical oxidation of organics. Also, see response to <u>GENERAL COMMENT #1</u>.</p>
11	7	<p><u>Appendix D.</u> This appendix includes the SOWs for technologies selected for treatability studies. Eighteen alternatives (various technologies versus various scales of testing) are selected for the sitewide treatability studies at RFP (Tables 4-6A, 4-6B and 4-7). However, only five SOWs are included in Appendix D. Appendix D should include the SOW for each selected alternative.</p> <p>The SOWs do not include explanations of monitoring treatability tests or analysis of samples collected. Comments on the August 26, 1991 final TSP suggested that general instructions for the requirements for monitoring and analytical considerations should be presented in the SOWs. However, none of this information was added to the SOWs in the annual report.</p> <p><u>Rationale:</u> The purpose of an SOW is to provide direction for the execution of a treatability study. The SOWs should be provided for each alternative selected as a site-wide treatability study at RFP. The SOWs should include all necessary information, including the information about monitoring of the experiment and analyzing input and output solutions, soils and gases.</p>	<p>See response to <u>GENERAL COMMENT #1</u>.</p> <p>As stated in response to the referenced comment on the Final TSP, the purpose of the SOWs was to ensure consistency among technology-specific work plans to be written at a later date. The details requested will be developed in the technology-specific work plans.</p>